Maris Graube

working group is now addressing these issues.

Tokens are generally considered best for a process-control environment for which real-time communications and tight control of a network are necessary. Dan Sze, manager of new systems interconnection development for IBM and a member of the IEEE committee, says that tokens are "highly efficient when bus utilization is fairly high, while CSMA is highly efficient where bus utilization is fairly low."

But Robert Printis, an engineer at Xerox, where Ethernet was developed, says, "If you consider all the complex protocol issues that must be satisfied, there might be a wash between CSMA/CD and tokens, or CSMA might be better." Still, Printis as well as representatives from DEC and Intel voted in favor of the IEEE compromise and noted that they had always sought to make Ethernet at least a subset of the group's standard.

Ethernet, according to the so-called "blue book" specification issued by the three participating companies, is designed "primarily for use in such areas as office automation, distributed data processing, terminal access, and other situations requiring economical connection to a local communications medium carrying bursty traffic at high peak data rates."

CSMA/CD advocates claim that the method is a well-documented, simple, tried-and-true approach to local networking. The CSMA/CD working group is seeking to clarify such concerns as the boundary between the link protocol and the access mechanism, the handling of very short frames, interframe spacing, and the degree of media independence.

Meanwhile, another IEEE local-networking subcommittee, the Media group, is evaluating various techniques, including broadband, baseband, and fiber-optic media and their relationship to the CSMA/CD and token access methods. In addition, there has been an agreement in principle as to the data-link-frame format. It includes an undefined synchronization preamble, a destination and source address each containing 8-bit multiples up to 56, a control frame of 8 bits, an information field of 8N bits, and a frame-check sequence of 16/32 bits.

The IEEE local-networking committee had hoped to have a standard ready by April, but that is now doubtful. —*CU*

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works from

Paring a local net with some Apples

SAN FRANCISCO—One of the most popular attractions at the new Sesame Place Amusement Park near Philadelphia is a two-level gallery that displays a bunch of 68 Apples. Some 7,000 people a day crowd their way into the room to interact with these Apples—microcomputers linked together in a data communications network for educational game playing.

A Cluster/One Model A local network built by Nestar Systems Inc. of Palo Alto, Calif., enables the Apple computers to share the centrally stored game programs. The Children's Television Workshop, which operates the educational theme park, employs two Nestar networks and one backup.

Called a "poor man's Ethernet" by some observers, the Cluster/One Model A brings the benefits of local networking to personal- and small-business-computer users. "We attempt to provide users with a local computer network that has the capabilities Xerox has developed with the Ethernet, but at a much lower price," says Harry Saal, Nestar president. While Ethernet can transmit data at 10 Mbit/s, Nestar's network operates at 250 kbit/s, fast enough for any office applications, Saal insists. "Everything has been scaled down to provide an inexpensive interface for an inexpensive workstation, but preserved are large-system capabilities and technology."

The packet local network can link up to 65 Apple II computers (Apple III will be supported by next summer), using one of the machines as a central controller/mass-storage manager. The central Apple is connected both to a Nestar central storage system, a 1.26-Mbyte dual floppy disk unit with an optional 16.5-Mbyte hard disk, and to the other workstations that can be scattered along a 1,000-foot twisted-pair bus.

Card link. Because each station has a unique address, it can communicate with any other station without knowing its location. The communications protocol is contained on communications cards required to hook each station to the network and includes automatic error detection and retransmission of garbled messages.

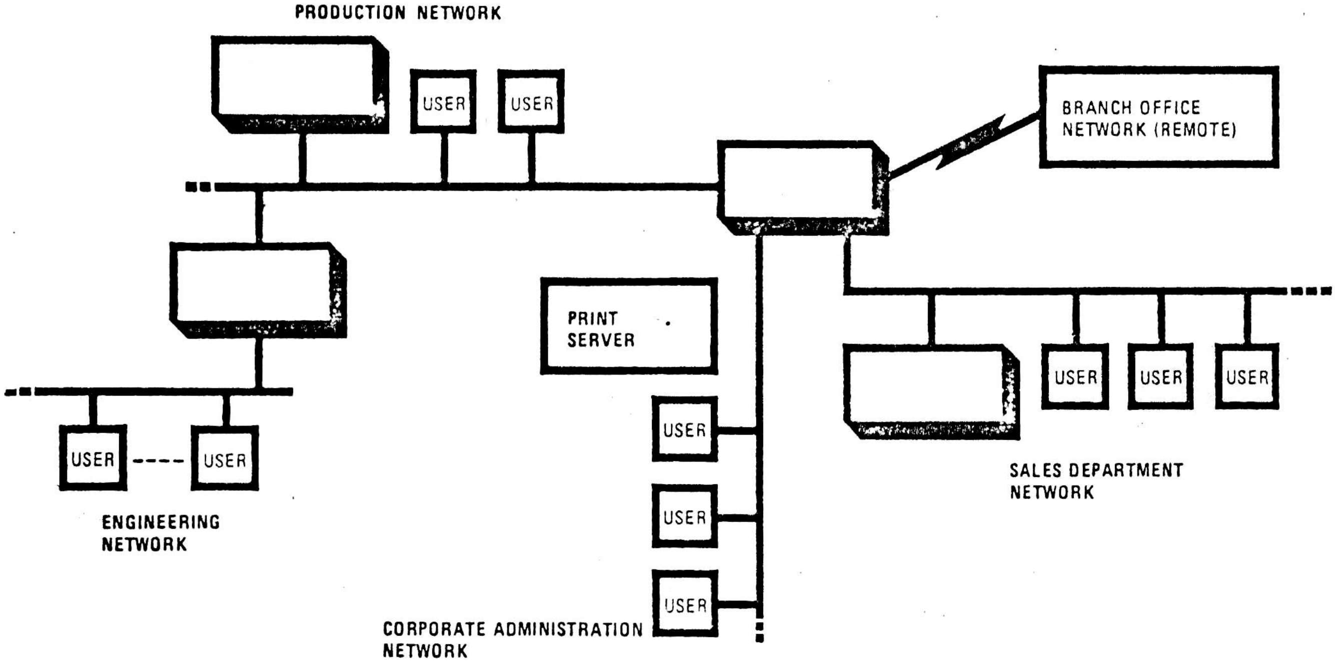
Basic costs for the network include $5,600 for the central file system and software and $395 for each network connection. The optional 16.5-Mbyte Winchester disk sells for $7,995, and a 33-Mbyte version, available later this year, will cost $9,995.

Messaging. Nestar recently introduced an electronic message scheme, called The Messenger, for use on Cluster/One and plans to add more features. Says Peter Hertan, vice president of marketing: "The hardware is all in place for our future products. We just have to complete the software."

He adds that the company will provide both software support enabling the shared use of printers and a communications link to tie multiple networks together. Each function will require the use of a separate dedicated Apple computer as a central controller.

Nestar's Saal says his two-year-

The cluster packet. *In the future, any number of Cluster/One local networks will be linked via internet "servers," which are made up of an Apple computer, disk memory, and software. Only the file server, comprising basically the same parts but different software, is now available, however, the internet and print units will be soon.*



PACKET FORMAT

DESTINATION ADDRESS	TYPE	LENGTH	DATA	16-BIT CYCLIC REDUNDANCY CHECK	ACK/NAK
1 BYTE	1 BYTE	1 BYTE	1-256 BYTES	2 BYTES	1 BYTE

ACKNOWLEDGE OR NEGATIVE ACKNOWLEDGE FROM RECEIVER

old company investigated the market for a long time before deciding to build its network around the Apple computers. "Our research shows the business community has adopted the Apple as its engine primarily because it is a better machine with better support and more applications software than other (small business) models."

Surprisingly, he says that Apple Computer Inc. has been not only tolerant but encouraging in its relations with Nestar. Apple does not offer a comparable local network.

"It's possible to do many of the same functions with alternative setups," says Robert Wickham, president of Vantage Research, a Mountain View, Calif.-based consulting firm. "But they are not as well-structured or organized and lack many features of the Nestar network. And to use something like Ethernet, Net/One, or Z-Net would be prohibitively expensive for a personal- or small-business-computer user."

Local importance. Wickham says the biggest limitation for Nestar is not in the product itself, but in getting personal- and business-computer users to understand the importance and value of establishing a local network. That may not be difficult, based on the enthusiasm of early Cluster/One users.

"If you calculated the cost of individual disk drives for each of our 68 stations compared with the network's shared resources—and the reliability of the hard disk—there would be no comparison," says Joyce Hakansson, project manager for software development at the Children's Television Workshop. "We are tremendously happy with the Nestar network."

Nestar has sold the network to state agencies, financial institutions, and universities, but it believes there will be more users in office environments.

Synergos, a Houston systems house, has developed a Nestar network for travel agencies that will automate accounting functions and replace many existing minicomputer systems. In addition, Nestar has sold one of its data communications networks to a major West Coast bank to automate a check-processing system. "We hope to break into the top 500 corporations to really bring microcomputers into everyday business use," says Hertan.

Optical bus seen for office networks

PARIS—Researchers at two Philips Data Systems subsidiaries in France are counting on a lightwave bus to handle communications in future office and automated production